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How do managers choose the firm's Capital Structure: *Evidence from Spin-Offs*

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Biographical Note

Emanuel Torres was born in Braga, in April 1994. In 2013, he started a bachelor's degree in Management at the University of Minho, which he completed in 2016.

During that bachelor he developed a special interest for finance, especially for corporate finance topics, which led him to pursue a Master in Finance, at Faculdade de Economia do Porto, started on September, 2016. The present dissertation is the last step for the conclusion of this course.

Since the beginning of the current year, he started his professional career as a Financial Analyst at APTIV, which by coincidence it's a spun-off company.

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Abstract

The capital structure theory has been under research since the original work of Modigliani and Miller (1958). Since then, new theories have emerged trying to explain how companies define their capital structure, and a vast empirical research was done.

However, we consider that past empirical studies suffer from a problem of "historical influence" because the decisions a company made in the past can influence the actual capital structure decisions. To control for this problem, we use a sample of companies involved in a spin-off because after that operation, a new and independent company is created, and its capital structure needs to be defined, therefore this scenario allows for a more clear interpretation.

That sample comprises 73 parent companies and 73 spun-off companies, from several countries, spanning from 2009 to 2017. Our methodology relies on panel data, with fixed effects model estimation.

We find that for the subsample of parent companies before the spin-off, the results are not supported by the capital structure theories. But, when analyzing the subsample of spun-off companies all the variables, except NDTS, have their relationship with leverage supported by the capital structure theories and empirical studies. In these results, we can also see a supremacy of the pecking order theory in explaining the capital structure choices. When analyzing the subsample of parent companies after the spin-off we also find all the coefficients signs being in the accordance with the expected.

Therefore, we find that before the spin-off managers don't follow any theoretical reasonings to support their capital structure decisions, but after the spin-off they do. Especially, the pecking order theory seems to better explain these decisions. Size and Asset Tangibility seem to produce a positive effect on leverage, while Growth Opportunities and Profitability have a negative relationship with leverage.

Key-words: Capital Structure, Pecking Order Theory, Trade-off Theory, Spin-Off.

JEL-Codes: G30, G32, C33

Resumo

A teoria da estrutura de capitais tem sido um tema bastante investigado após o trabalho de Modigliani and Miller (1958). Desde aí, surgiram novas teorias e um vasto número de estudos empíricos.

Contudo, nós consideramos que estes estudos empíricos até agora realizados sofrem de um problema de "influência histórica", porque as decisões que uma empresa tomou no passado podem condicionar as decisões atuais acerca da definição da estrutura de capitais. Para mitigar este problema, utilizamos uma amostra de empresas envolvidas num *spin-off* porque após essa operação, uma nova e independente empresa é criada, para a qual tem de ser definida uma estrutura de capitais. Isto permite-nos uma interpretação mais realista e fiável.

A amostra utilizada é composta por 73 empresas-mãe e 73 empresas *spun-off*, de vários países, num período de 2009 a 2017. A metodologia baseia-se na estimação de um modelo de efeitos fixos, utilizando dados em painel.

Concluímos que os resultados para a amostra de empresas-mãe antes do *spin-off* não são suportados pela teoria da estrutura de capitais. Mas, quando analisamos a amostra de empresas *spun-off*, todas as variáveis exceto NDTS têm a sua relação com o endividamento suportada pelas teorias e pelos estudos empíricos já realizados. Nestes resultados podemos também ver uma supremacia da teoria da *Pecking Order* em explicar as decisões da estrutura de capitais. Quando analisada a amostra de empresas-mãe após *spin-off*, também podemos concluir que os resultados são de acordo com o esperado pela teoria.

Portanto, os resultados deste estudo mostram que antes do *spin-off* os gestores não parecem seguir a teoria para definir a estrutura de capitais, mas nas amostras das empresas após o *spin-off* acontece o oposto. Os determinantes Dimensão e Tangibilidade dos Ativos parecem estar positivamente relacionados com o endividamento, enquanto que as Oportunidades de Crescimento e a Rendibilidade têm a relação oposta.

Palavras-chave: Estrutura de Capitais, Teoria da *Pecking Order*, Teoria do *Trade-off*, Spin-Off.

Classificação JEL: G30, G32, C33

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1. Introduction

In finance, capital structure is a concept that defines the proportion of the two main capital sources – debt and equity – that a corporation uses to finance its total assets. The decision about the proportion of debt and equity to be used to finance a company plays a very important role in the financial decisions of a firm. Choosing the right proportion helps to minimize the WACC, to increase the firm's value and can also affect the firm's profitability and its risk because defining wrongly the company's capital structure may cause financial distress, or even bankruptcy, if the company fails to cover the debt obligations. That's why it is so important for managers to understand the theory of capital structure and the main determinants that influence its formation.

This theory was initially coined by Modigliani and Miller (1958) and it has inspired many researchers to further examine and develop it. Since then, some of the original assumptions were gradually relaxed by other authors, and new theories were developed trying to explain how companies define their capital structure. That was the case of trade-off and pecking order theories, two of the most relevant modern theories.

Based on these theories and in other related empirical studies, we identify five determinants of capital structure that have been proved to be the most relevant ones. They are the size, growth opportunities, profitability, asset tangibility, and non-debt tax shield. However, the effect of these firm characteristics on leverage is not consensual between the capital structure theories. In the case of some determinants, they posit conflicting predictions regarding their relation with leverage. So, there is still the need to further examine the validity of theoretical determinants and conclude about which theory best describes the managers' choices on capital structure. And that is what we propose to do.

However, we pretend to do it differently from what has been done in prior studies. In our opinion, these prior studies suffer from a problem of "historical influence". That is, the operating and financial decisions a company made in the past have influence in the decisions that must be made in the present and, because of that, the relationship between firm characteristics and leverage is not that easily detectable. Therefore, to control for this problem, we use a sample of companies involved in a spin-off since, after that operation, a new and independent company is created (with a new board of directors and traded separately from the parent company). For that reason, this sample provides a very special opportunity to study the conscious managers' decisions about capital structure formation in

the newly created company (the spun-off company), controlling for the majority of the effects of historical decisions.

Our sample is comprised of 73 parent companies and 73 spun-off companies, from several countries, spanning from 2009 to 2017, with data organized in panel. We will analyze these subsamples separately, doing a regression in the parent companies before and after the spin-off, and another one in the sample of spun-off companies. By this way, we can study the capital structure formation separately in the two set of companies, that are in different life-cycle stages, compare the results and conclude about the influence of past decisions on the actual capital structure's choice.

To do this study, we recur to a multiple linear regression model, controlling for time effects with year dummies and for heteroscedasticity using standard errors robust to heteroscedasticity.

Therefore, our objective is to add a new and "clean" analysis to the existent literature about capital structure, studying the determinants that most influence the capital structure choices in companies that were newly created - the spun-off companies. Additionally, we intend to conclude whether there are relevant differences between the way parent companies before the spin-off (in the presence of historical decisions' effect) and the newly created spun-off companies define their capital structure. Lastly, we add some conclusions about which of the main capital structure theories – the trade-off and pecking order – best describes the capital structure formation.

Apart from the introduction, the work assumes the following structure: in chapter 2, there is a review of the main literature references on this topic and the theories underlying to the determinants of company's capital structure; in chapter 3 it is defined the research hypotheses to be tested in this study; in chapter 4, we present the model and methodology to be used, the sample, the definition of the variables of the model and the main descriptive statistics. The empirical results for all the subsample regression analysis are presented in chapter 5; and finally, in chapter 6 it is made a summary of the conclusions of this work and the suggestions for future research.

2. Literature Review

The theme of capital structure was originally boosted by Modigliani and Miller, in 1958, originating since then a vast literature with relevant empirical and theoretical developments. These authors demonstrated that, under some specific assumptions (that will be presented later), the capital structure is irrelevant and does not affect the firm's value.

However, as these assumptions were gradually relaxed, new theories were developed trying to explain how companies define their capital structure. That was the case of trade-off and pecking order theories, that assume the capital structure as a relevant factor for the firm's value.

In this chapter, we intend to do a theoretical review of the above capital structure theories and realize how can they be helpful to understand the companies' financing decisions. In a first place, the Modigliani and Miller model and its assumptions will be presented, followed by the trade-off theory and, lastly, the pecking order theory.

2.1. Main Theories of Capital Structure

2.1.1. Modigliani and Miller model

Also called "M&M theorem", it was a milestone from which several related theories were developed. Their work states that, in a perfect market context, the value of a firm is not affected by its capital structure. This perfect market context means: the absence of market frictions (no bankruptcy costs, no agency costs, no transaction costs and no tax), the absence of arbitrage opportunities, the absence of asymmetric information and homogeneous expectations from investors relative to the company's future profitability. Considering all these assumptions, the authors formulated two important propositions:

Proposition I:

This proposition states that, in a perfect market, the market value of a company is independent of its capital structure. That is, the proportion of debt and equity chosen by the company does not impact its value. Instead, the authors argue the company's market value derives from the discounted future cash flows. Therefore, according to this proposition, the market value of a company is a function of its capacity to generate future cash flows and of its investment policy.

Proposition II:

In their second proposition, the authors propose that the higher the debt-to-equity ratio, the higher will be the required rate of return on equity - because the equity holders will face a higher risk in a company highly financed by debt. Therefore, they consider that the value of a levered company equals the value of an unlevered company plus a risk premium.

In 1963, Modigliani and Miller reformulated the model, recognizing the financial benefit from tax-deductible expenses (as the interest payments). They conclude that the company's value will increase as its level of debt increases. However, the authors emphasize that it doesn't mean firms should be entirely financed by debt, because cheaper alternatives of financing can be available, like the retained earnings, and because some lenders restrict the amount they lend to a given company.

Nevertheless, by the fact that this theory just holds under a context of perfect market, it was challenged in several subsequent studies. In these studies, the assumptions of Modigliani and Miller's study were seen as unrealistic and then successively eliminated, yielding different theoretical perspectives regarding capital structure determinants, proving that in fact capital structure has an impact on the firm's value. The two main theories resulting from this, were the trade-off theory and the pecking order theory, that we address with more detail in the next pages.

2.1.2. Trade-off Theory

In this theory, originally developed by Kraus and Litzenberger (1973), the M&M's assumptions for corporate taxes and bankruptcy costs are relaxed. The trade-off theory, as mentioned by Myers (1984), suggests that firm's value increases with leverage because the interests are tax deductible, providing a tax shield; but that increase is offset by a negative effect of debt - the bankruptcy costs. So, increasing the level of debt brings benefits because of the tax shield but also increase the probability of financial distress, therefore managers need to trade-off between these two consequences. According to this theory, a firm can maximize its value when it chooses a capital structure that optimizes the relationship between the benefits of the tax shield and the costs of bankruptcy.

Analytically, this can be represented as follows:

Firm's Value = Equity Value + PV (Tax Shield) - PV (Costs of Financial Distress)

After the first work of Myers, in 1984, additional studies were made by several authors to test this trade-off theory. Sheik and Wang (2010) stated that the Trade-Off theory chooses the capital structure that maximizes the value of the company by minimizing the costs of prevailing market imperfections. According to Chen (2010), companies that have access to more tax advantages will issue more debt to finance business operation and the cost of financial distress and benefit from tax shield are balanced. Ebaid (2009) also provide empirical evidence supporting the trade-off theory and the positive relationship between capital structure and firm performance.

In sum, this theory indicates the existence of an optimal debt-to-equity ratio that maximizes the firm's value.

2.1.3. Pecking Order Theory

The theory of pecking order was developed by Myers and Majluf (1984) and emphasizes the role of asymmetric information in the firm's operation. Contrarily to the trade-off theory, this theory does not admit the existence of an optimal capital structure or an optimal level of debt, but that companies follow a hierarchical order of preference by types of financing. The pecking order states that internal resources (like retained earnings) are preferred to the external ones (with debt being preferred over equity).

Since the outside investors/market doesn't have all the information, Ebaid (2009) suggests they may undervalue the firm's new shares relative to the intrinsic value measured by managers (who understand the whole picture of the firm's operation). Hence, issuing more equity will likely hurt the current value of the existing firm's stocks, due to the transfer of value between the new and old stockholders. Therefore, when capitalizing, managers will avoid equity capital and select firstly internal sources. If internal financing is not enough, the firm will issue debt - with short-term debt being the first choice because does not require collateral, and then long-term debt. As a last resort, it comes the equity. Additionally, Hamilton and Fox (1998) found that managers are not very receptive to the issue of equity since it means the entrance of new shareholders and managers don't like to lose their control over companies. So, to finance their projects they try to use internal earnings as a first option.

Based on the asymmetric information, the pecking order theory implies that firms only issue new shares at overprice relative to the current stock price. Thus, issuing new shares signals that the equity may be overpriced and, more importantly, that the firm is not

confident enough to be financed by debt. Contrarily, Myers (1984) argue that if a firm is willing to use debt capital, it signals a healthy and confident position about the future.

Additionally, as profitable firms generate higher retained earnings, the more profitable a firm is the less debt it needs to use. Rajan and Zingales (1995) approved this negative relationship between profitability and leverage, indicating that profitable firms use more retain earnings and certainly, less debt. Some other studies also concluded results that underpin the pecking order theory, as it's the case of Friend and Lang (1988), Titman and Wessels (1988) and Kester (1986). However, some other studies also found contradictions about this theory, like Fama and French (2005) that suggest financial decisions usually don't follow the predicted by the pecking order theory.

In sum, pecking order theory suggests that asymmetric information affects the firm's choice in capital financing and that firms follow a hierarchy of financing decisions (where internal sources of financing are preferred to the external ones). Moreover, it suggests a negative relation between profitability and leverage.

2.2. Similar empirical studies

There are several empirical studies that have already studied the determinants of capital structure. But, our study differs from these by the fact we use a sample of spin-offs to analyze the most relevant determinants to define a company's capital structure. Nevertheless, we based ourselves on these past studies as a start point to select the variables we will study and how we will measure them, to define the expected relationship of these variables with the leverage, and consequently design our research hypotheses.

In the following table, we sum up the conclusions we retrieved from the most important empirical studies, concerning the determinants of capital structure and their relationship with the leverage ratio of the company. We conclude that the most relevant determinants of capital structure's choice, confirmed in past studies, are the size, growth opportunities, profitability, asset tangibility and non-debt tax shield.

In table 1 we can see the relationship of these selected determinants of capital structure with the leverage ratio, found on the most relevant empirical studies. It is possible to conclude that size and asset tangibility are positively related with leverage in the majority of these studies. By contrary, growth opportunities, profitability and non-debt tax shield were found to have a negative relationship with leverage in most of the mentioned studies.

Table 1 - Empirical studies on determinants of capital structure

This table summarizes the results from relevant empirical studies about the determinants of capital structure. "Positive" means the respective determinant of capital structure has a positive relationship with leverage, that is, they follow in the same direction. "Negative" means the determinant of capital structure has a negative relationship with leverage, that is, they follow in opposite direction.

Determinants/ Authors	**Titman and Wessels (1988)**	**Rajan and Zingales (1995)**	**Wald (1999)**	**Chen and Strange (2005)**	**Frank and Goyal (2007a)**	**Chang et al. (2009)**
Size	Positive	Positive	Positive	Positive	Positive	Positive
Growth Opportunities	---	Negative	Negative	Positive	Negative	Negative
Profitability	Negative	Negative	Negative	Negative	Negative	Negative
Asset Tangibility	---	Positive	Positive	Positive	Positive	Negative
Non-Debt Tax Shield	---	----	Negative	----	Negative	Negative
Sample Characteristics	469 USA companies (1974 – 1982)	4557 companies G7 countries (1987-1991)	4404 companies from 5 countries (1991-1992)	972 Chinese companies (2003)	USA companies (1950-2003)	Companies from several countries (1988-2003)

3. Research Hypotheses

In this chapter, we intend to introduce the research hypotheses that will be empirically tested further in this study. To formulate the hypotheses, firstly we identify from past studies which variables are most relevant when choosing the company's capital structure – that information was already revised in table 1, from the previous chapter. Secondly, based on the previously reviewed capital structure theories and based on the results obtained from similar empirical studies, we establish a prediction of the impact of these variables on the level of leverage of the companies in our sample.

As we mentioned before, based on the past literature, we identify as the most relevant and consistent determinants of capital structure: the size, growth opportunities, profitability, asset tangibility and non-debt tax shield. Then we will detail each one of these variables, including the supporting literature, and formulate the respective research hypotheses.

3.1. Size

The majority of the studies suggest size as an important determinant of a company's capital structure. Larger companies tend to be more diversified, have more stable cash-flows and, hence, they face lower bankruptcy costs because the probability of failure is smaller. Therefore, larger companies can access external financing at a lower cost.

Rajan and Zingales (1995), Titman and Wessels (1988) and Wald (1999) found a positive relationship between a company's size and leverage, whereby the larger the company the bigger the tendency to get financed by debt.

Additionally, Ferri and Jones (1979) and Frank and Goyal (2007) also found similar conclusions concerning the positive relationship between leverage and firm size.

Therefore, based on the above studies, we formulate the first research hypotheses, as follows:

H1: *There is a positive relationship between firm size and leverage.*

3.2. Growth Opportunities

Myers (1977) suggests that companies with more growth opportunities tend to have access to more profitable investment opportunities, being more profitable companies and hence less levered. Additionally, the high growth whose value comes from intangible growth opportunities could also represent higher earnings volatility relative to the future, and so, that

growth firms do not want to commit themselves to debt servicing as their revenue may not be available when needed. Therefore, the author suggests a negative relationship between growth opportunities and leverage. Jensen and Meckling (1976), Myers (1977), Harris and Raviv (1991), Stulz (1990), Wald (1999), Rajan and Zingales (1995) and Kim and Sorensen (1986) also reach similar conclusions regarding the negative relationship between growth opportunities and leverage.

The trade-off theory is also in line with a negative relationship between growth and leverage. It considers that growth opportunities are particular cases of intangible assets that add value to a firm but cannot be used as a collateral, which represent more difficulties in raising debt in favorable terms (because, in the case of bankruptcy, the value of the growth opportunities will be close to zero), reducing thereby the use of leverage by growth companies. The empirical evidence from similar studies, as we mentioned above, is consistent with the trade-off theory.

Therefore, according to the majority of the past empirical studies, and with the trade-off theory, we formulate the second hypotheses to be tested, as follows:

H2: *There is a negative relationship between growth opportunities and leverage.*

3.3. Profitability

Profitability is a well-recognized determinant of capital structure and analyzed under different theories. From the point of view of the trade-off theory, high profitability reduces the probability of financial distress and induces firms to increase debt levels to exploit the tax deductibility of interest paid on debt. Hence, trade-off theory posits that there exists a positive relationship between profitability and leverage.

On the other hand, the pecking order theory suggests a negative relationship between profitability and leverage. This theory proposes that retained earnings take the first place in the hierarchy of financing sources, and so the more profitable a firm is, the more retained earnings it should have, and so the need to issue debt diminishes. In practice, firms with high and stable profitability (for instance, Microsoft, Google or Intel) tend to have low debt leverage.

Nevertheless, the empirical findings seem to confirm the negative relationship between profitability and debt. Titman and Wessels (1988) found that relationship to be negative and the results consistent with the pecking order theory, for a US sample. Kester

(1986) found similar results for Japanese firms. Rajan and Zingales (1995) found that profitability is negatively correlated in all countries of their sample except Germany.

In sum, according to the past literature, although the results are still controversial, there is a strong empirical evidence on the negative association between profitability and leverage. Therefore, we define the third hypotheses to be tested, as follows:

H3: *There is a negative relationship between profitability and leverage.*

3.4. Asset Tangibility

Tangibility refers to the level of fixed assets over firm's total assets. The tangible assets of the company are considered one of the main guarantees of repayment for the creditors, since this type of assets can be used as a collateral, particularly in case of bankruptcy. Furthermore, fixed assets increase tax deductions for depreciation. Thus, the more fixed assets, the more non-debt tax shield.

So, as Gaud et al. (2005) and Rajan and Zingales (1995) concluded, the more tangible assets a firm has, the easier is to issue debt and less information about future profits is needed to be revealed. Additionally, Jensen and Meckling (1976), and Myers (1977) suggest that, according to the agency theory, firms with high leverage tend to invest sub-optimally, transferring wealth away from debtholders to equity holders. These cause lenders to require collateral because, as the authors suggested, the use of secured debt can help alleviate this problem. So, using secure debt provides a higher probability of recovering their debt payments which leads to lower agency costs and lower expected costs of distress (consistent with the trade-off theory). As mentioned by Scott (1977), firms unable to provide collaterals will have to pay higher interest or will be forced to issue equity instead of debt. Frank and Goyal (2007) and Wald (1999) also found that companies with more tangible assets tend to be more levered.

Therefore, according to all the studies presented, a positive relation between tangibility and leverage is predicted.

On the other hand, the pecking order theory predicts that firms holding more tangible assets are more easily evaluated by investors and they are expected to be less prone to asymmetric information problems, and thus less likely to issue debt. This argument suggests a negative relationship between asset tangibility and leverage.

As we showed before, the vast majority of the empirical literature suggests a positive relationship between asset tangibility and leverage. Therefore, we define the fourth hypotheses to be tested, as follows:

H4: *There is a positive relationship between asset tangibility and leverage.*

3.5. Non-Debt Tax Shield

Non-debt tax shield can be defined as the other items apart from interest expenses that also contribute to a decrease in tax payments. Examples of that can be depreciation, investment tax credits, corporate taxes and personal taxes. DeAngelo and Masulis (1980) argue that these non-debt tax deductions can serve as substitutes for the tax benefits of debt financing. As a result, firms with large non-debt tax shields can choose to use less debt to limit its negative effects.

Kim and Sorensen (1986) also support that depreciation is an effective tax shield, and thus offsets the tax shield benefits of leverage. Frank e Goyal (2007) and Wald (1999) reach similar conclusions.

Therefore, if non-debt tax shields are substitutes for a debt-related tax shield, the relation between non-debt tax shields and leverage should be negative. The trade-off theory supports this negative relationship.

We define the fifth hypotheses to be tested, as follows:

H5: *There is a negative relationship between non-debt tax shield and leverage.*

We summarize the above research hypotheses in the table 2.

Table 2 - Research Hypotheses

This table summarizes the research hypotheses presented in this chapter. To formulate the hypotheses, firstly we identify from past studies which variables are the most relevant when choosing the company's capital structure; secondly, based on the main capital structure theories and similar empirical studies, we establish a prediction of the impact of these variables on the leverage of the companies in our sample.

H1	There is a positive relationship between ***firm size*** and leverage.
H2	There is a negative relationship between ***growth opportunities*** and leverage.
H3	There is a negative relationship between ***profitability*** and leverage
H4	There is a positive relationship between ***asset tangibility*** and leverage.
H5	There is a negative relationship between ***non-debt tax shield*** and leverage

4. Methodology and Sample

We start this chapter by introducing the methodology we will rely on for pursuing this study, followed by the variables of the model and its measures. Lastly, we introduce our sample and data collection process, as well as the main descriptive statistics.

4.1. Methodology

To identify the determinants that most impact the capital structure choice in the companies of our sample, we will resort to the regression analysis. In this case, we rely on a Multiple Linear Regression Model, because it allows us to study the relationship between one dependent variable and a set of independent variables. The hypotheses under study are confirmed when the explanatory variable in question is statistically significant and its coefficient sign is in accordance with the theoretical formulation.

Analytically, the model that will be used to do the regression can be expressed as follows:

$$LEV_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 GROWTH_{i,t} + \beta_3 PROFIT_{i,t} + \beta_4 TANG_{i,t} + \beta_5 NDTS_{i,t} + \mu_{i,t} \quad (1)$$

Where:

- *i* refers to the firm (cross-sectional dimension) and *t* refers to the year (time series dimension);
- $LEV_{i,t}$ denotes the leverage of company *i* in year *t*, and it is the dependent variable;
- The remaining variables (Size, Growth Opportunities, Profitability, Asset Tangibility and Non-Debt Tax Shield) are the independent variable of the model;
- β_0 is the constant term and β_1 to β_6 are the regression coefficients of the explanatory variables.
- $\mu_{i,t}$ represents the error of the model, also designated as disturbance term.

For this study, we rely on panel data since we intend to focus on both time series and cross-sectional effects, and because it can give better results with small data samples (which is our case), as the cross observations collected during a period are combined, and so the number of observations increases (Sun and Parikh, 2001). Additionally, as referred by Hsiao et al. (2006), it allows for a more accurate inference of model parameters since panel data usually contain more degrees of freedom and more sample variability, hence improving the

efficiency of econometric estimates; and it can better find effects that are not observable in cross sections or time series data, resulting in a generally more robust and capable method.

In the literature, the most used methods to estimate regressions with panel data are the fixed effects and the random effects models. In our study, to know which one is the most suitable for our sample, we run the Hausman test – where under the null hypotheses random effects is preferred and under the alternative hypothesis the fixed effects model is more appropriated and then preferred. We perform this test at the beginning of each regression analysis we do and choose the appropriate model for each one.

We include year dummy variables for each year of the regression, in order to control for variables that are constant across firms but evolve over time and to capture the influence of aggregate time-series. Using year dummies gives as a warranty that the effects are not being driven by a specific year. These year dummies were included in all the regressions of our study.

We intended to add some more dummy variables to control for other effects and perform other analysis, but due to the reduced size of our sample, it is not practicable.

Additionally, to control for the impact of heteroscedasticity, we estimate panel-corrected standard errors (PCSE) robust to heteroscedasticity. This is important because heteroscedasticity tends to produce p-values that are smaller than they should be, and so we could be concluding that a model term is statistically significant when it is not, which leads to bias in test statistics.

4.2. Variables Definition

In this section, we intend to define the variables that will be considered in the analysis, and how they will be measured, in order to test the previously defined hypotheses. Firstly, the **dependent variable** will be the leverage, since we intend to study the relationship between the determinants of the capital structure and the level of leverage chosen by the companies of our sample. To measure that variable, we rely on relevant past studies (specifically, Bradley et al., 1984; Rajan and Zingales, 1995; Padron et al., 2005) and use the following proxy:

$$Leverage\ (LEV) = Total\ Debt\ /\ Total\ Debt + Market\ Capitalization$$

The **independent variables** represent the determinants of capital structure that we have selected before, according to the existing literature. They will be measured as follows:

4.2.1. Size

In the literature, it has been used three different indicators to represent the firm size: the logarithm of sales (Gaud et al, 2005; Rajan and Zingales, 1995; and Titman and Wessels, 1988), the logarithm of enterprise value (García-Teruel and Martinez-Solano, 2010), and the logarithm of total assets (Padron et al, 2005; Frank and Goyal, 2007). In this study, we select the natural logarithm of total assets as a proxy for the company's size.

4.2.2. Growth

Typically, in the literature, the Market-to-Book ratio is the most frequently used indicator to measure growth opportunities (for instance, the studies of Rajan and Zingales, 1995; and Chang et al., 2009). Alternatively, the capital expenditures (CAPEX) over Total Assets or the ratio of R&D over Total Assets are also used by some authors, especially in studies with samples containing private firms where it is not possible to get the Market-to-Book ratios. Some other studies have also used asset growth to measure growth opportunities, which is calculated by the percentage of growth in sales (subtracting previous year assets from that of the current year and dividing the result by previous year assets). However, in this study, we will use the Market-to-Book ratio to measure this variable.

4.2.3. Profitability

According to past studies, some different proxies were used to measure profitability, such as the ratio of Operating Income (EBIT) over Sales (or over Total Assets) used by Titman and Wessels in 1988, Wald in 1999, and Chen and Strange in 2005; and the Return on Assets ratio (used in Karadeniz et al., 2009). In this study, we use the ratio of EBIT over sales as an indicator of profitability.

4.2.4. Asset tangibility

Measures of asset tangibility proposed in past literature include the ratio of Fixed Assets plus Inventories over Total Assets, as used by Chen (2004) and Gaud et al. (2005). That is the measure we will use.

4.2.5. Non-debt tax shield

The majority of the studies concerning the determinants of capital structure have been measuring this variable with the ratio of Depreciation divided by Total Assets. This is also the proxy we use to measure this variable.

To summarize the above information, we organize in table 3 the proxies that will be used to measure the variables of our model.

Table 3 - Variables Definition

This table presents the variables used in the model and how we measure them. Leverage is the dependent variable, while Size, Growth Opportunities, Profitability, Asset Tangibility and Non-Debt Tax Shield are the independent variables.

Type	Variable	Proxy to measure the variable
Dependent	Leverage	*LEV = Total Debt / Total Debt + Market Cap.*
Independent	Size	SIZE = Ln (Total Assets)
Independent	Growth Opportunities	GROWTH= Market Cap / Book value
Independent	Profitability	PROFIT = EBIT / Total Assets
Independent	Asset Tangibility	TANG = BV of Fixed Assets + Inv. / Total Assets
Independent	Non-Debt Tax Shield	NDTS = Depreciation / Total Assets

4.3. Sample, Data Collection and Descriptive Statistics

In order to build the sample for this study, we recurred to *Zephyr* database to get the spin-off deals, and to Eikon *Datastream* to get the financial data for companies involved in these spin-off deals. The sample is comprised of companies from several countries, spanning from 2009 to 2017.

After the data collection, we found a lot of missing data for some years and companies that *Datastream* was unable to retrieve. And because of the reduced size of the

sample (since there are not so many spin-off operations each year) we could not afford to simply eliminate from our sample these companies with missing data. Therefore, we search manually for that data on companies' annual reports, for each missing year, and crossing all the information channels available to get the needed data.

Additionally, we have also removed companies that belong to the financial, insurance and utilities sector to avoid capital structures dictated by regulatory considerations/accounting rules, since in these situations the capital structure's choices do not rely entirely on managers' decisions.

After all, this resulted in a sample comprised of 146 companies, where 73 are parent companies and the other 73 are spun-off companies, corresponding to a total of 1215 firm-year observations.

Due to the nature of this study and data, we divided the whole sample in two: one with the parent companies and another one with the spun-off companies. In this way, we can study the capital structure formation separately in the two set of companies, that are in different life-cycle stages, compare the results and also conclude about the influence of past decisions on the actual capital structure's choice.

Lastly, it is also important to refer that, to minimize the influence of possible outliers in our data, we resort on the technique of *Winsorization*, limiting the extreme values. We did a 99% winsorization, which means all data below the 1st percentile was set (and not eliminated) to the 1st percentile, and all data above the 99th percentile was set to the 99th percentile.

In table 4 we can find the main descriptive statistics for both the parent companies before the spin-off and the spun-off companies sample. From this analysis, we also intend to start deriving some conclusions about the differences in companies' capital structure before and after the spin-off.

Table 4 - Descriptive Statistics

This table presents the descriptive statistics of the variables in both the sample of parent companies before the spin-off and the sample of spun-off companies. All variables were retrieved from the *Datastream* database and are winsorized at the 1st and 99th percentiles. LEVERAGE (measured as Total Debt / Total Debt + Market Cap) is the dependent variable. SIZE (ln of Total Assets), GROWTH OPPORTUNITIES (market-to-book ratio), PROFITABILITY (EBIT / Total Assets), ASSET TANGIBILITY (BV of Fixed Assets + Inventories / Total Assets) and NDTS (Depreciation / Total Assets) are the independent variables.

VARIABLES	PARENT COMPANIES BEFORE SPIN-OFF					
	MEAN	MEDIAN	MAXIMUM	MINIMUM	STD. DEV	OBS
Leverage	0.275	0.228	0.997	0.000	0.283	239
Size	14.021	14.126	23.655	6.988	3.485	239
Growth Opportunities	1.902	1.420	15.990	-19.560	2.517	239
Profitability	-0.060	0.050	0.677	-3.161	0.359	239
Asset Tangibility	0.325	0.237	0.967	0.000	0.284	239
Non-Debt Tax Shield	0.023	0.015	0.147	0.000	0.026	239
VARIABLES	**SPUN-OFF COMPANIES**					
	MEAN	**MEDIAN**	**MAXIMUM**	**MINIMUM**	**STD. DEV**	**OBS**
Leverage	0.270	0.147	0.895	0.000	0.297	466
Size	13.593	14.071	20.576	6.987	3.563	466
Growth Opportunities	2.174	1.320	8.913	-0.850	2.238	466
Profitability	-0.072	0.026	0.790	-1.076	0.313	466
Asset Tangibility	0.342	0.289	0.949	0.001	0.283	466
Non-Debt Tax Shield	0.022	0.016	0.084	0.000	0.021	466

As we can see in table 4, the dependent variable (leverage) in both the parent companies before the spin-off and the spun-off companies has an average rounding 27%. These means that the companies of both samples have an average debt level of 27,5%, which can be considered a low level of leverage. So, about the dependent variable, there is not a significant difference between the before and the after the spin-off.

Regarding the independent variables, the volatility of the variables Growth Opportunities, Profitability and Non-Debt Tax shield on the parent companies' sample is a little bit high since the standard deviation is higher than the mean of these variables. In the spun-off companies' sample, the variables with high volatility are the Growth Opportunities and Profitability.

It is also important to note that Asset Tangibility and Non-Debt Tax Shield present a minimum value of zero in both samples, which is consistent with the fact that there are no negative amounts of assets and depreciation, respectively.

Additionally, in both samples, we can verify a high difference between maximum and minimum on variables Size and Growth Opportunities, resulting in higher standard deviations. However, we should be in mind that companies in our sample are in different stages of their life cycle and with different dimensions, which derives the so different values on variables related to growth and size of the companies.

Lastly, we can verify that the minimum values of Growth Opportunities and Profitability are negative in both samples, and this is perfectly normal because that market-to-book (the proxy used to measure growth opportunities) can be negative and the EBIT can also be negative (EBIT/Total Assets was the proxy used to measure profitability, then a negative EBIT will result in a negative profitability ratio).

In sum, we cannot see any significant difference in descriptive statistics between the two samples. In the next chapter, we will analyze the regressions' results and derive deeper conclusions about the capital structure formation.

In order to know if correlation is present in our data, we analyze the Pearson's correlation coefficients between the variables and the variation inflation factor (VIF), whose results are in Appendix A. Since the coefficients are very low, indicating a low correlation between the variables, and the VIFs are below 10 (Wooldridge, 2013) we don't need to be concerned with multicollinearity problems in our regressions.

5. Empirical Results and Discussion

In this chapter, we present and discuss the empirical results obtained. We analyze the regression results in the context of the capital structure theories earlier discussed and based on the expected results expressed in our research hypotheses.

As described before, we regress separately three subsamples: one with spun-off companies, another one with parent companies before the spin-off and the third one with parent companies after the spin-off. Additionally, each sample will be divided into another two subsamples according to their earnings volatility, with the aim of studying the impact of this variable on capital structure formation.

5.1. Sample of Parent Companies before the Spin-Off

Starting with the subsample of 73 parent companies in the years before the spin-off, we can find in table 5 the regression results when using Fixed Effects model, as the Hausman Test suggests (for 5% level of confidence we reject the null hypothesis, that says Random Effects is the appropriate model, and accept the alternative - Fixed Effects being the appropriate model).

Analyzing the regression results found in table 5 we can see that, except size, none of the variables have a result in accordance with the expected from the theories, showing an opposite relationship with leverage. However, just the Size and Growth Opportunities' coefficients are statistically significant, at 10% and 5% respectively. Size has a positive coefficient, which means bigger companies tend to incur more debt, and Growth Opportunities show a negative coefficient, meaning the more growth opportunities a company has, the less debt it will incur, which goes against what is found in other studies. So, in this regression, we can only validate Hypothesis 1, since it posits a positive relationship between Size and Leverage, and that variable is positive and statistically significant at 10% in our model.

Therefore, we can conclude that managers of parent companies of our sample, in the periods before the spin-off, don't follow a theoretical reasoning to make capital structure decisions. The capital structure theories, as well as the past empirical studies, don't support the relationships between the determinants and leverage that we found in this sample's regression. So, it seems the capital structure formation is a consequence of several past

decisions, and it is not influenced by these determinants, as the past research and theories showed.

Table 5 - Regressions Output: Sample of Parent companies before the Spin-Off

This table summarizes the output of OLS estimation of panel data regressions for a sample comprised of Parent companies before the Spin-Off operation, during the period 2009 – 2015, using Fixed Effects model, as indicated by the Hausman Test. The dependent variable is LEVERAGE (measured as Total Debt / Total Debt + Market Cap). The independent variables are: SIZE (ln of Total Assets), GROWTH OPPORTUNITIES (market-to-book ratio), PROFITABILITY (EBIT / Total Assets), ASSET TANGIBILITY (BV of Fixed Assets + Inventories / Total Assets) and NDTS (Depreciation / Total Assets). The three regressions include year dummy variables and standard errors robust to heteroscedasticity. Coefficient values are listed at the first row and t-statistics are in brackets. ***, ** and * means the variable is statistically significant at 1%, 5% and 10%, respectively.

Independent Variables	**Expected Sign**	**Whole Sample**	"High Volatility" Subsample	"Low Volatility" Subsample
Size	+	0.018* (1.874)	0.038*** (4.934)	-0.003 (-0.436)
Growth Opportunities	-	0.003** (2.093)	0.003** (2.339)	0.000 (0.038)
Profitability	-	0.056 (1.352)	0.011 (0.249)	-0.072** (-2.488)
Asset Tangibility	+	-0.034 (-0.490)	-0.112* (-1.731)	0.084* (1.831)
NDTS	-	0.638 (0.824)	-0.779* (-1.739)	1.640* (1.812)
R-Squared		0.788	0.792	0.841
Adjusted R-Squared		0.673	0.664	0.724
F-Statistic		6.825***	6.206***	7.209***
Observations		239	122	117
Companies		73	35	38
Hausman Test		23.274**		

Later, we will analyze the sample of spun-off companies – if we see results in accordance with the predicted by the capital structure theories and empirical studies, we would be able to conclude that, in fact, historical decisions have influence in the actual decisions of capital structure formation.

Additionally, in order to study the influence of volatility in the capital structure formation, we divided each sample into two other subsamples: one with companies that have earnings volatility above the median value, that we call "high volatility" companies, and the other one comprised of companies with earnings volatility below the median value – that we call "low volatility" companies. It is intended to find out if there are some considerable differences between the two set of companies, and see if companies' volatility impacts the results.

We can find the results on the same table 5 and see that the coefficients of the variables Asset Tangibility and Non-Debt Tax Shield become statistically significant in both high and low volatility sample, while in the whole sample they weren't. Asset Tangibility variable has a positive relationship with leverage in the low volatility sample regression, which is the expected sign according to past studies and theories. The Non-Debt Tax Shield's coefficient has a negative relationship with leverage in the high volatility sample regression, which is also in accordance with the expected sign.

Another interesting result is in the Profitability variable. Its coefficient gains statistical significance only in the low volatility sample and presents a negative relation with leverage, which corresponds to the expected relation.

Lastly, both Size and Growth Opportunities' coefficients loses their statistical significance in the regression of low volatility sample.

5.2. Sample of Spun-off Companies

Focusing on the results of the subsample of 73 spun-off firms, spanning from 2009 to 2017, we can find in table 6 the regression results when using Fixed Effects model, as the Hausman Test suggests.

Analyzing the R-Squared we can conclude about the explanatory capacity of the model. In this case, the R-Squared is 84,67% which means that this model can explain almost 85% of the variation on the leverage level. Looking for the F-Statistic, we can also conclude the model is significant.

Examining the coefficients of the variables and starting with **Profitability**, its coefficient is statistically significant at 1% and has a negative relation with leverage, which is consistent with Hypothesis 3 presented before. This means that when a company's profitability increases, its leverage level decreases, so more profitable firms will become less

levered over time – which seems to be in accordance with pecking order theory that says more profitable firms use more internal funds, instead of debt. These results are in line with the ones from Titman and Wessels (1988), Rajan and Zingales (1995) and Wald (1999) studies.

Table 6 - Regressions Output: Sample of Spun-off companies

This table summarizes the output of OLS estimation of panel data regressions for a sample comprised of spun-off companies, during the period 2009 – 2017, using Fixed Effects model, as indicated by the Hausman Test. Additionally, it also contains the results for the regression of the first year after the spin-off, of each company. The dependent variable is LEVERAGE (measured as Total Debt / Total Debt + Market Cap). The independent variables are: SIZE (ln of Total Assets), GROWTH OPPORTUNITIES (market-to-book ratio), PROFITABILITY (EBIT / Total Assets), ASSET TANGIBILITY (BV of Fixed Assets + Inventories / Total Assets) and NDTS (Depreciation / Total Assets). The three regressions include year dummy variables and standard errors robust to heteroscedasticity. Coefficient values are listed at the first row and t-statistics are in brackets. ***, ** and * means the variable is statistically significant at 1%, 5% and 10%, respectively.

Independent Variables	**Expected Sign**	**Whole Sample**	**First year after Spin-Off**	"High Volatility" Subsample	"Low Volatility" Subsample
Size	+	0.009 (0.730)	0.017* (1.961)	0.018** (2.242)	-0.049 (-1.345)
Growth Opportunities	-	-0.025*** (-5.488)	-0.041*** (-4.016)	-0.015* (-1.899)	-0.052*** (-5.711)
Profitability	-	-0.134*** (-3.659)	0.175* (1.954)	-0.121** (-2.371)	-0.623*** (-2.935)
Asset Tangibility	+	0.128** (2.443)	0.093 (1.028)	0.103* (1.954)	0.287** (2.094)
NDTS	-	1.305** (2.350)	2.515*** (3.489)	2.203** (2.055)	-0.037 (-0.052)
R-Squared		0.847	0.443	0.657	0.887
Adjusted R-Squared		0.812	0.401	0.569	0.855
F-Statistic		24.334***	10.645***	7.469***	27.407***
Observations		466	73	241	225
Companies		73	73	36	37
Hausman Test		24.118 **			

Regarding **Growth Opportunities**, its coefficient is also statistically significant at 1% and negatively related to leverage, which is in line with Hypothesis 2. This result suggests

that companies with more growth opportunities tend to be less levered. This is in accordance with the results obtained by Rajan and Zingales (1995), Wald (1999) and Frank and Goyal (2007a), and supports the pecking order theory because it states that companies with more growth opportunities tend to be more profitable, assuming less debt.

In relation to **Asset Tangibility**, the results show that its coefficient is statistically significant at 5% and positively related to leverage, which is in conformity with the Hypothesis 4. This result indicates that the more tangible assets a company has, the more debt it is prone to assume. Titman and Wessels (1988) also got similar results and refer that tangible assets can be used as a collateral in debt loans, facilitating the company's access to debt at more favorable terms. Rajan and Zingales (1995) and Wald (1999) found similar results. The positive relation between asset tangibility and leverage that our results show is supported by both trade-off and pecking order theories.

The coefficient of **Non-Debt Tax Shield** is also statistically significant at 5% and presents a positive relation with leverage, which means the more non-debt (for instance, depreciation, investment tax credits or corporate taxes) tax shield a company has, the more debt it assumes. However, this positive sign is contrary to the theoretical expectation, which doesn't allow us to validate Hypothesis 5. Bradley et al (1984) also obtained this same conclusion, because they argue that firms that invest heavily on tangible assets and thus generate higher levels of depreciation and tax credits, tend to have higher levels of leverage since they need resources to finance these investments. Additionally, Graham (2005) presents similar conclusions. Nevertheless, despite being a statistically significant variable we have to reject the Hypothesis 5.

Lastly, the coefficient of the variable **Size** is the only one that is not statistically significant in this regression, and so we have to reject hypothesis 1.

So, in the regression results of this sample, we can see a supremacy of pecking order theory in explaining the capital structure choices, since Profitability, Growth Opportunities, and Asset Tangibility have their relationship with debt supported by pecking order theory, while there is just one variable in accordance with trade-off theory – which is Asset Tangibility, that in this case is supported by both theories. With these results, we validate 3 of the 5 research hypotheses.

To reinforce the results of this analysis and to see even more clearly the managers decision on capital structure formation, in this sample we selected just the first year following

the spin-off and regress the model. The results are on the same table 6, and it is interesting to see they are very similar to the ones in the "whole sample", which reinforces our previous results. The only changes are on the variable Asset Tangibility that lost statistical significance and on the variable Profitability that shows a different coefficient sign.

That being said, we can conclude that managers of the companies in our sample tend to define the spun-off's capital structure following rational reasonings and theories. In the previous analysis for parent companies before the spin-off, we saw the results indicate that managers didn't follow any theory when defining the company's capital structure. But, when a new company is created in a spin-off, we see the relationship between the determinants of capital structure and the leverage is the one predicted by past empirical studies and main theories, with a supremacy of pecking order theory in explaining the managers' decisions.

So, this can indicate that in fact the past decisions and past circumstances a company has in its historic can impact and influence the decisions that have to be made today, regarding the capital structure formation. This reinforces the relevance of our idea of testing these determinants in a more clear way, using a sample of spun-off companies recently created, in order to eliminate the majority of the historical influence in the capital structure decisions. Thus, we are able to see the direct managers' influence and choices when defining a company's capital structure.

Additionally, in order to study the influence of volatility in the capital structure formation, we divided each sample into two other subsamples: one with companies that have earnings volatility above the median value, that we call "high volatility" companies, and the other one comprised of companies with earnings volatility below the median value – that we call "low volatility" companies. It is intended to find out if there are some considerable differences between the two set of companies, and see if companies' volatility impacts the results.

Starting with the "high volatility" companies, we can see, still in table 6, that all the variables' coefficients are statistically significant and have all the same relation with debt (with different but very similar magnitudes) as the main sample presented before.

For the companies with lower volatility, Growth Opportunities, Profitability and Asset Tangibility keep the statistical significance, as well as their relationship with leverage. However, the variables Size and Non-Debt Tax Shield show opposite relationship with

leverage in relation to the "whole sample" and to the "high volatility" sample, and both are not statistically significant in this sample, while they were in the others.

Therefore, the level of volatility appears to provoke slight differences in the analysis, since on the spun-off companies with lower volatility, Size and Non-Debt Tax Shield seems to not be relevant determinants to explain the capital structure formation, when in the main spun-off companies' sample they were.

5.3. Sample of Parent Companies after the Spin-Off

After analyzing the results for parent companies before the spin-off and for spun-off companies, we do this analysis also for the parent companies after the spin-off. With this, we intend to see if the spin-off operation caused some alterations on the way managers define the capital structure of the parent companies.

This subsample is comprised of 66 companies, with data spanning between 2009 and 2017, which resulted in 440 observations. Consulting the regression results, present in table 7, we can see that all independent variables are statistically significant except Asset Tangibility.

Size coefficient is statistically significant at 1% and presents a positive relation with leverage, which indicates that bigger companies tend to be more levered. This result is in line with the trade-off theory which argues that largest firms are more diversified and face lower default risk, which facilitates the access to debt.

Growth Opportunities' coefficient is also significant at 1% and negatively related to leverage, so it means that when companies increase their growth opportunities, they tend to reduce the use of debt. This result is similar to the ones found on main capital structure studies, that we have presented before, and supports pecking order theory, as it states that companies with more growth opportunities tend to be more profitable, assuming less debt.

The coefficient associated to **Profitability** is statistically significant and negatively related to leverage, which means more profitable companies tend to use less debt. This is also in accordance with the expected relation and supported by the pecking order theory.

Non-Debt Tax Shield coefficient is significant at 1% and presents a negative relationship with leverage, which is in accordance with the expected and supported by the trade-off theory.

From these results, we can conclude that for the parent companies in the periods after the spin-off, we have not a leading theory that can explain the firms' decisions about

their capital structure. The trade-off theory can explain the variables' relationship with leverage for the variables Size and Non-Debt Tax Shield. The Pecking order theory can explain the same relationship for the variables Profitability and Growth Opportunities.

Table 7 - *Regressions Output: Sample of Parent companies after the Spin-Off*

This table summarizes the output of OLS estimation of panel data regressions for a sample comprised of Parent companies after the Spin-Off operation, during the period 2009 – 2017, using Fixed Effects model, as indicated by the Hausman Test. The dependent variable is LEVERAGE (measured as Total Debt / Total Debt + Market Cap). The independent variables are: SIZE (ln of Total Assets), GROWTH OPPORTUNITIES (market-to-book ratio), PROFITABILITY (EBIT / Total Assets), ASSET TANGIBILITY (BV of Fixed Assets + Inventories / Total Assets) and NDTS (Depreciation / Total Assets). The three regressions include year dummy variables and standard errors robust to heteroscedasticity. Coefficient values are listed at the first row and t-statistics are in brackets. ***, ** and * means the variable is statistically significant at 1%, 5% and 10%, respectively.

Independent Variables	**Expected Sign**	**Whole Sample**	"High Volatility" Subsample	"Low Volatility" Subsample
Size	+	0.039*** (1.874)	0.031*** (5.255)	0.045*** (10.747)
Growth Opportunities	-	-0.014*** (2.093)	-0.013*** (-2.795)	-0.011* (-1.715)
Profitability	-	-0.108*** (1.352)	-0.067** (-2.537)	-0.573*** (-2.637)
Asset Tangibility	+	0.016 (-0.490)	0.104* (1.954)	-0.139** (-2.423)
NDTS	-	-1.833*** (0.824)	-0.913 (-1.023)	-3.079** (-2.195)
R-Squared		0.852	0.831	0.867
Adjusted R-Squared		0.819	0.784	0.832
F-Statistic		26.180***	17.861***	25.257***
Observations		440	224	117
Companies		66	35	38
Hausman Test		27.488**		

We can also conclude that after the spin-off, the regression's results are much more consistent with the capital structure theories and with other empirical studies, than in the regression for the period before the spin-off. The results of the sample of parent companies before the spin-off shows that none of the variables except Size have their relationship with

leverage supported by capital structure theories. In this sample of parent companies after the spin-off, the results show that all the coefficient signs are in line with the ones predicted by the capital structure theories and past studies, and all the variables' coefficients except Asset Tangibility being statistically significant.

It is interesting to see the so different results for the same companies, but for different periods separated by a spin-off event. As we saw in the previous analysis, before the spin-off the parent companies don't have their capital structure formation justified by any theoretical reasoning. But, in this analysis with the same companies but for periods after the spin-off, we can see that all the capital structure determinants are in accordance with the predicted by the past literature and by the theories (although we can't define a leading theory), which represents an abrupt change on the way managers define the company's capital structure.

In the analysis of the volatility impact on capital structure formation, we can see that there are no big differences in the statistical significance and in the sign of the coefficients, as well as its magnitude. The exception is for the variable Asset Tangibility, that gains statistical significance when we analyze the subsamples individually and in the low volatility sample its sign is in accordance with the expected one; and for the variable Non-Debt Tax Shield that loses its statistical significance when analyzing only the high volatility sample.

Apart from these exceptions, volatility seems to not have a big impact in this sample of parent companies in the periods after the spin-off.

6. Conclusion

With the aim of analyzing the managers' capital structure choices, we use a sample comprised of companies involved in a spin-off operation. This provides a very special opportunity to analyze the capital structure formation because in the spin-off a new independently company is created, with a new board of directors, and almost with a "blank page" of past decisions influencing the further decisions that must be made, especially the ones concerning the capital structure formation.

We collected data from *Zephyr* and *Datastream*, as well as from companies' annual reports, to build a sample comprised of 73 parent companies and 73 spun-off companies, from several countries. The data is structured in panel, and we regress each sample independently. After performing a Hausman Test for each regression we found the fixed effects model to be the most appropriated.

Firstly, we analyzed the regression results of the parent companies' sample, in the periods before the spin-off. The results indicate that, except Size, none of the variables shows a relationship with leverage in accordance with the expected from past empirical studies and theories. Size and Growth Opportunities' coefficients were the only ones statistically significant at 10% and 5% respectively, with Size presenting a positive relationship with leverage and Growth Opportunities a negative one. But, as Size is the only one presenting an expected and statistically significant coefficient, we could only validate Hypothesis 1. From these results, we could conclude that managers of parent companies of our sample, in the periods before the spin-off, don't make capital structure decisions supported by the main theories and past empirical studies.

Then, we proceeded with the analysis of the spun-off companies, in order to find if managers decide based on theoretical reasonings when the company is newly created and a capital structure has to be designed. From the results, we could see that only one variable (NDTS, which presents a positive relationship with leverage) doesn't have its relationship with leverage supported by the capital structure theories and empirical studies. All the others have coefficients in accordance with the expected: Size and Asset Tangibility have a positive relationship with leverage, and Growth Opportunities and Profitability have a negative one. Additionally, these results also show a supremacy of the pecking order theory in explaining the capital structure choices. Therefore, when we analyze a sample with newly created companies, managers seem to follow the theory to decide about capital structure formation, which can indicate that the past decisions a company made can influence the capital structure

decisions that have to be made today. This reinforces the relevance of our idea of testing these determinants in a more clear way, using a sample of spun-off companies recently created, in order to eliminate the majority of the historical influence in the capital structure decisions.

As an addition to the prior analysis, we did the same analysis for parent companies but, this time, in the period after the spin-off. We intended to see if the spin-off provoked some alterations on the way managers define the capital structure for the parent companies. The results of this subsample show that there is not a leading theory to explain their capital structure formation, because two of them (Size and NDTS) are supported by the trade-off theory, and the other two (Profitability and Growth Opportunities) are supported by pecking order theory; however, all of them are in accordance with the expected results based on the most relevant past studies. Only the coefficient associated to Asset Tangibility was not statistically significant. With this analysis, it was interesting to note that after the spin-off the results are much more consistent with the theory than the results of the same companies but for a period before the spin-off, where the variables' coefficients were the opposite of the expected. Therefore, the spin-off seems to provoke a shift in the way managers define the capital structure.

In sum, it is possible to conclude from this study that a spin-off provides a very special opportunity to study the managers' conscious decisions about capital structure formation, since the results indicate that when considering companies with the influence and limitations of past decisions, the capital structure is not designed according to the established by the theory. But when we analyze a sample of spun-off companies, which are newly created companies with little to none past decisions influence, the results indicate that managers decisions are in accordance with the expected from past empirical studies, with the pecking order theory being the one that best describes the way managers choose the company's capital structure. In both samples concerning the periods after the spin-off (the sample of spun-off companies and the sample of parent companies after the spin-off) Size and Asset Tangibility seem to produce a positive effect on leverage, while Growth Opportunities and Profitability have a negative relationship with leverage. The Non-Debt-Tax-Shield have a positive relationship in the sample of spun-off companies and a negative one in the sample of the parent companies after the spin-off.

6.1. Limitations of this Study and Suggestions for Future Research

The biggest limitation of our study is clearly the reduced size of its sample. For that reason, it is important to mention that all the conclusions need to be taken carefully.

Naturally, the first suggestion for future research is to consider a more extent sample. Including more years in the time span of the sample would also be a good suggestion to increase the number of firm-year observations.

Additionally, after getting a bigger sample, it would be interesting to insert industry dummies in the model, since the type of industry can affect the company's capital structure. In our study, as we have a sample of reduced size it was not practicable to introduce more dummy variables.

Finally, another suggestion for future research is to include the effect of taxes on the capital structure choices and analyze country-specific factors, because the capital structure can be influenced by other factors beyond firm-specific factors.

7. References

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8. Appendices

8.1. Appendix A – Multicollinearity Testing

Table 8 - Pearson's correlation coefficients - Sample of Spun-off companies

VARIABLES	Size	Growth Opportunities	Profitability	Asset Tangibility	NDTS	Leverage
Size	1.000					
Growth Opp.	-0.002	1.0000				
Profitability	0.412	-0.048	1.0000			
Asset Tangibility	-0.097	-0.024	-0.065	1.0000		
NDTS	0.138	0.021	-0.163	0.336	1.0000	
Leverage	0.341	0.006	0.063	0.106	0.254	1.0000

Table 9 - Pearson's correlation coefficients - Sample of Parent companies before Spin-Off

VARIABLES	Size	Growth Opportunities	Profitability	Asset Tangibility	NDTS	Leverage
Size	1.0000					
Growth Opp.	-0.066	1.0000				
Profitability	0.474	-0.006	1.0000			
Asset Tangibility	-0.099	-0.246	0.092	1.0000		
NDTS	0.331	-0.034	0.266	0.192	1.0000	
Leverage	0.399	-0.321	0.237	0.223	0.444	1.0000

Table 10 - VIF for the sample of Spun-off companies

Independent Variable	VIF
Size	1.458
Growth Opp.	1.082
Profitability	1.342
Asset Tangibility	1.173
NDTS	1.2048

Table 11 - VIF for the sample of Parent companies before Spin-off

Independent Variable	VIF
Size	1.306
Growth Opp.	1.047
Profitability	1.331
Asset Tangibility	1.160
NDTS	1.243